INTRODUCTION

For nearly two decades futuristic weapon systems, including lasers, high power microwave systems, and electric guns, have been in various stages of research and development. Such weapon systems may have potential to substantially increase our capability to defeat enemy forces with significantly less logistics burden. Despite dedicated efforts to study and demonstrate the utility of such weapons and despite many significant advances in the state-of-the-art for some critical technologies, a vast majority of the military community does not project that these weapons will be incorporated into the designs of ground combat platforms in the near future. The major barrier preventing advanced concepts from being weaponized is the lack of compact pulsed power systems required for operating them. In fact, the desire for future combat systems to become more mobile, lighter and smaller seems to conflict directly with the desire to utilize advanced weapon systems in new vehicle designs. Pulsed power sources that have been developed for advanced weapons add too much weight and volume to already O\Restressed mechanical systems if these new systems are incorporated into future combat vehicle concepts. The DARPA Combat Hybrid Power Systems (CHPS) program was established to investigate hybrid electric power systems that might provide all the energy and power needs of improved future combat vehicles - specifically the transient, continuous and pulsed power necessary to drive advanced weapons systems, mobility systems, communications systems and protective systems. By exploiting the benefits of hybrid power, power management and power sharing, it may become possible to design future combat vehicles with advanced weapons and protection systems, while reducing logistical requirements (by increasing efficiency) and reducing overall weight and volume. This paper will describe the CHPS program goals and accomplishments as well as provide insight on how the CHPS approach to design of future vehicles is an essential step toward demonstrating lightweight, future ground combat vehicles capable of improved mobility, lethality, survivability and sustainability.

Many current U.S. combat vehicles are nearing the end of their useful service lives. At the same time, we find that the roles and missions of the U.S. military are being changed or modified in response to the need for flexible, agile, effective military forces in the rapid!~ changing global social and political environment. Projections of how we will have to fight in the future require us to explore ways to improve combat systems performance in terms of lethality, survivability, transportability, mobility &

agility, strategic & tactical deploy ability, and sustainability. Improving the effectiveness of combat systems while reducing their footprint is vital - both to enable rapid deployment and to maintain military dominance with a reduced number of personnel and vehicles. In addition, it is essential to improve subsystem and total system efficiency in order to decrease reliance on fossil fuels and to reduce the costs associated with logistical support. Army Force XXI concepts for the 2010 timeframe and the Army After Next concepts for 2020/2025 have been envisioned to employ a variety of advanced weapons systems and protective systems in combination to achieve their goals. By adding requirements for vehicles to address multiple missions (such as direct fire support, air defense, and scout/RSTA on the same platform), these concepts offer a way to reduce the total number of vehicles on the battlefield (thereby reducing the logistics tail.) However, these concepts present serious problems for the conventional vehicle designer who has limited trade options. The usual practice is to trade off weight and volume of weapon systems or protection to get deploy ability and mobility that are central to most future concepts of operations.

Review of literature:

Passive millimeter wave (PMMW) imaging technology is based on constructing 2D images by detection of natural passave electromagnetic (EM) radiation at millimeter-wave bands.1,2 The main source of this natural radiation is either cosmic background radiation (CBR) that is remnant heat left over from the Big Bang3 or thermal radiation from an object or body whose temperature is greater than 0 K8. 4 One of the important applications of PMMW imaging is doubtlessly the detection of hidden weapons in airports and other checkpoint sites.5,6 For the recent years, many researchers have demonstarted that PMMW imaging can be an effective method for detecting and imaging concealed dangerous objects such as guns, knives, dielectric explosives with fair image features.7,8 Although active imaging systems at millimeter wave frequencies have the potential of being harmful to the nearby people, PMMW imaging technology provides completely safe detection of concealed weapons9,10 because of the fact that PMMW receiver only gathers the passive, non-ionizing radiation from the target. Another important advantage of PMMW technology is such that it can work almost all undersired weather conditions of snow, rain, fog and fire since the CBR’s operational frequency is much higher than other radar frequencies and can also pass through these mediums without any trouble.11,12 Furthermore; unlike active radar receivers, PMMW receiver has the ability to collect the scattiring from almost all angles from the target since the ambitEnt CBR has the ability to illuminate almost all sides of the target due to multireflection around nearby obstacles.

lectically propelled ships gained popularity by the early 20th century, with the rapid development of submarines and mediumcapacity container ships, mainly using dc motors [1]. Synchronous ac motors have since been amplayed for naval propulsion systems, but due to the restricted operation of the available power electronic devices at that time, these configurations were too expensive and unreliable, and they featured poor performance in terms of speed and torque control [2]. Improvements in power electronics devices and drive control schemes as well as the development of high-efficiency multiphase induction and synchronous motors have pushed the advancement of electric ship propulsion systems and applications [3]–[7]. Depending on the power requirements and propulsion system arrangement, different electrical propulsion systems have been developed based on two-level and multilevel converters using series-connected and/or multilinking electric machines [8]. In this context, several configurations have also been used that either integrate all electrical network components in only one power system or separate the mechanisms in several power systems, such as in warships, where propulsion systems are partitioned from weapon systems, due to the large amount of power required for propulsion. New developments of electrically propelled ships are based on an integrated energy distribution system architecture that releases large amounts of energy for pulsed-power weapons and large propulsion machines. Pulsedpower weapons have a significant energy demand, requiring large-capacity power systems and improved dynamic characteristics, compared to traditional and legacy ships.

The trend towards electrification is apparent in all the transportation systems. Ships are facing the same evolutionary trend, which is pushed forward by different factors depending on the specific application [1], [2]. As an example, in merchant area the air pollution regulations are setting stringent requirements that cannot be achieved by only upgrading the internal combustion engines. Thus, an efficiency increase is sought, by means of a more integrated design approach and enabled by the onboard loads electrification. Concerning naval ships, the main factor pushing toward electrification is the development of new weapon systems and sensors, all electrically supplied. Obviously, efficiency and air pollution concerns affect also Navies, strengthening the motivations in moving towards this direction [3]. In this context, all the major Navies in the world are undergoing fleet modernization processes, starting from the front-line combat ships (frigates and destroyers). The new ships have requirements that significantly differ from the ones of their precursors, such as dual-use capabilities and increased electric power production (to supply the new weapon systems and sensors [4÷7]). The significant electric power generation capability makes the electric propulsion a viable option, which is also boosted by the efficiency improvement achievable thanks to the electrification of onboard loads. The foreseeable result is an increase in ship’s range, with related improvement in mission capabilities. Moreover, silent operation is another appreciable feature of electric propulsion, which proves to be a significant advantage for naval ships. Thus, the Integrated Power and Energy System (IPES) concept can be exploited also in frontline surface combatant ships, both as an enabler for the new weapon systems and sensors, and as a mean to improve ship mission capabilities. However, while a full-electric solution may require weights and volumes that are excessive for a front-line ship, the hybrid solution (electric propulsion for low speeds, mechanical for high speeds) is a viable option [1] [8].

The US Navy envisions a Fleet that applies advances from the technology sector to improve the delivery of warfighting capability. Due to constraints imposed by legacy hardware design inherent and the inherent limitations of x86 servers, significant inefficiencies exist in the hardware and software delivery process. The US Navy leveraged advancements in virtualization technology to field combat system software in virtual machines, effectively removing computing hardware as a capability limiter. Adoption of hardware-agnostic virtual machines also significantly reduced the delivery timeline for improved warfighting capabilities at a lower cost. This paper will review the evolutionary enhancements in AEGIS Combat System computing architecture and describe why it is critical for the Surface Navy to adopt a new capability delivery model. This paper also outlines the key engineering and testing advantages of the US Navy AEGIS Virtual Twin effort, which recently demonstrated continuous capability delivery to the Fleet. Finally, this paper will explore the multifactor framework of the Balanced Scorecard as a tool to align the benefits of virtualization and advances in computing technology with a new model for future US Navy Combat Systems.

Limitation:

- Commercial hybrid auto system can not be used in combatant system.
- There is no current program for hybrid combatant

- Undertaking this project will be costly.
- In order to make hybrid technology survive, the Army needs to cool the components. In order to properly cool the components, you have to add some type of cooling system — which then adds more weight to the vehicle
- The Combatants focus these days is on armor, not alternative fuels.
- Under certain operating conditions you can achieve some fuel economy. But militaries cannot do hybrid-electrics just to save fuel